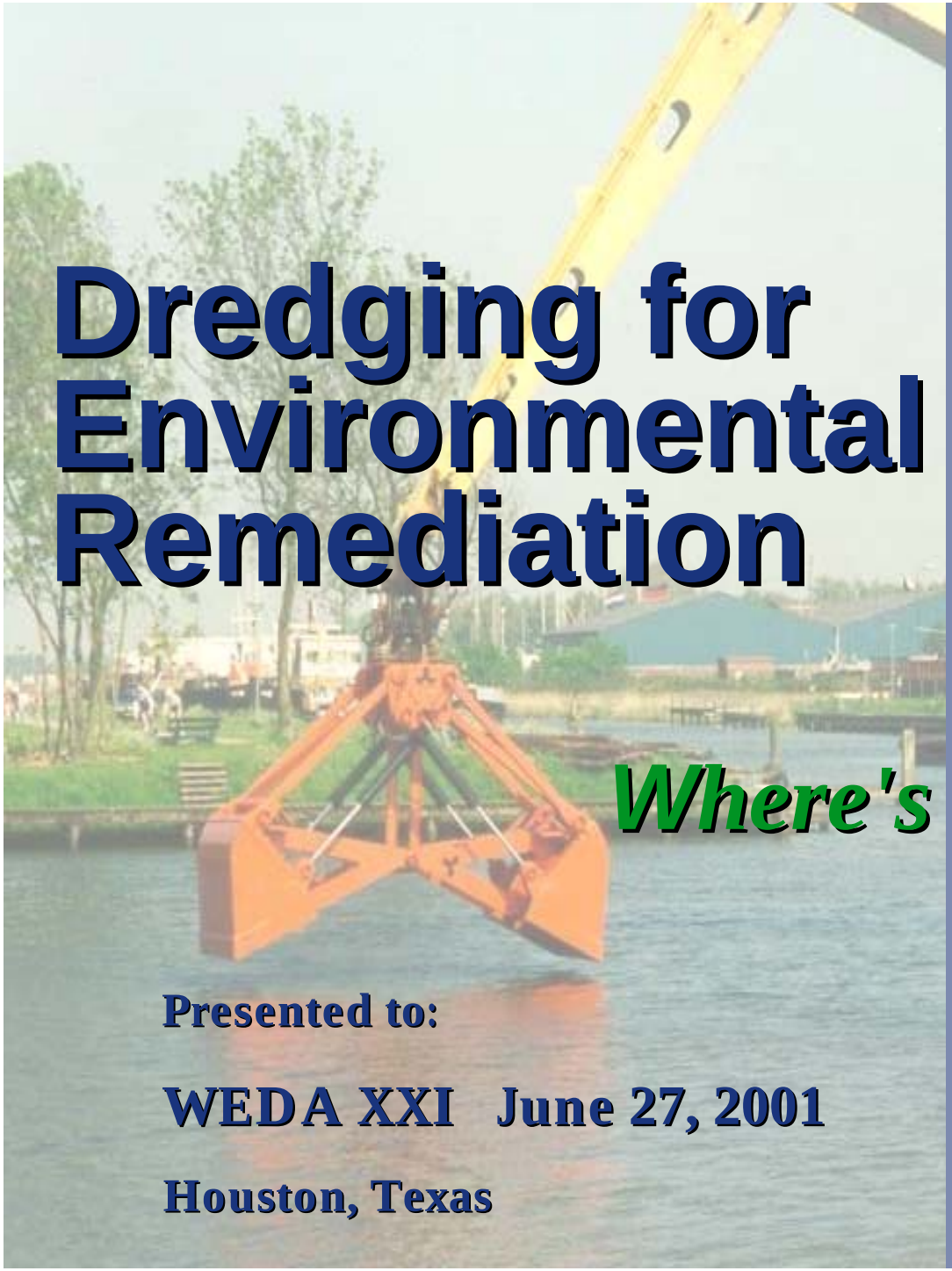


Dredging for Environmental Remediation

BEAN ENVIRONMENTAL

New Bedford Harbor

Pre-design Field Test

Where's the leading edge?

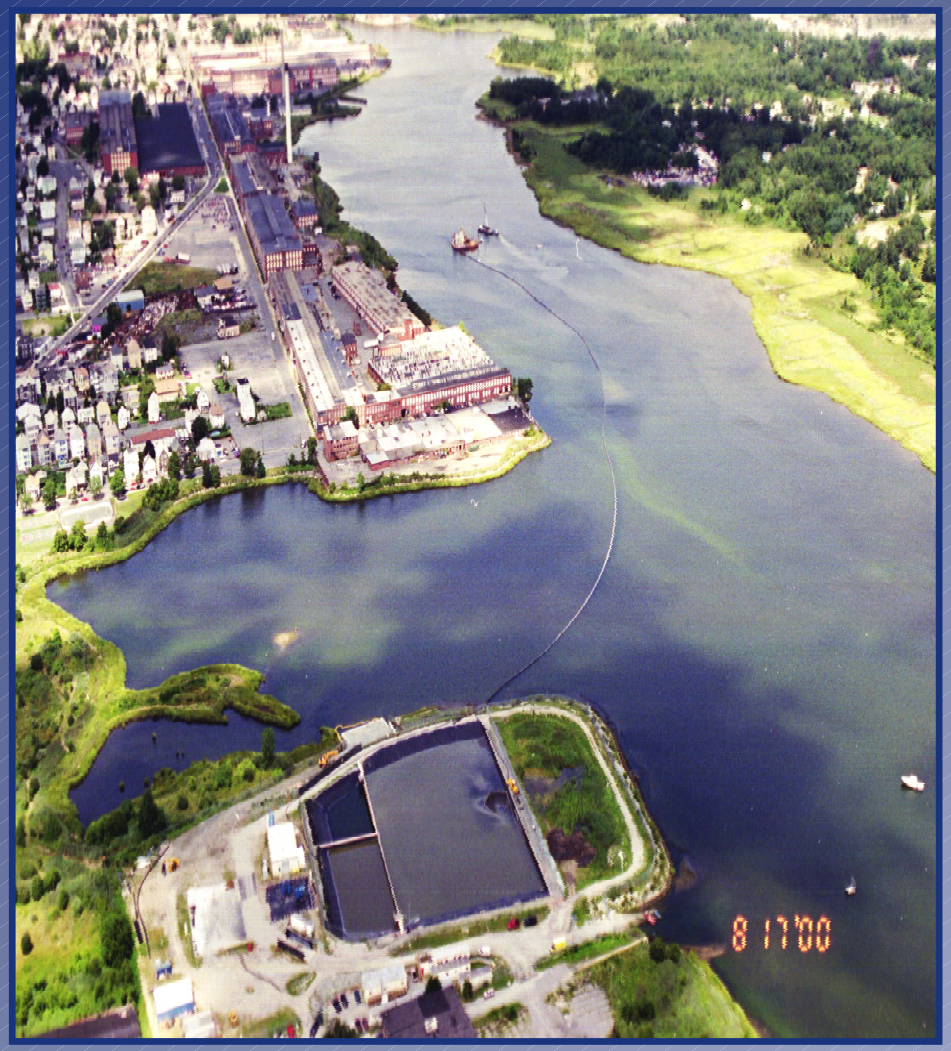
Presented to:

WEDA XXI June 27, 2001

Houston, Texas

By Ancil Taylor

New Bedford Harbor Pre-design Field Test



- *Solicited by the New England District US Army Corps of Engineers under Total Environmental Remediation Contract (TERC) Task Order No. 0017 – New Bedford Superfund Site*
- *Contracted to Foster Wheeler Environmental (FWENC)*

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Dredge Technology Selection

- *FWENC screened over sixty (60+) dredge technologies around the globe*
- *Bean Environmental LLC "short-listed" as one of three potential demonstration candidates.*

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Bean Environmental LLC

- ***C F Bean LLC***
  - Over 58 years of experience
  - Leading the US dredging industry in innovation and technology development
  - Leading sediment remediation company
  - Headquarters in New Orleans, La.
- ***Royal Boskalis Westminster***
  - Over 100 years of experience
  - Largest dredging contractor in the world with over 3100 employees
  - Leading worldwide innovation in remediation technology

BEAN ENVIRONMENTAL

Finding solutions *first.*

1953

First to mount a dragline directly onto a barge.

1970

First to use dredging technology for beach nourishment.

1972

First to use underwater pump technology in a cutter-suction dredge in the U.S.

1984

First to fully automate the production functions of a large cutter-suction dredge in U.S.

1992

First in the U.S. to design and build a dredge specifically for beach and wetland restoration.

1993

Awarded patent for Slurry Processing Unit and pioneered high accuracy dredging techniques.

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Bean Environmental LLC

Services provided

- *Engineering and Design*
- *Excavation*
- *Transportation*
- *Volume reduction, Dewatering & Soil Washing*

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Dredge Performance Tests

- *Sediment removal accuracy*
- *Transportation and disposal efficiency*
- *PCB removal effectiveness (secondary)*
- *Air &Water quality impacts by the dredging operation*
- *Production*

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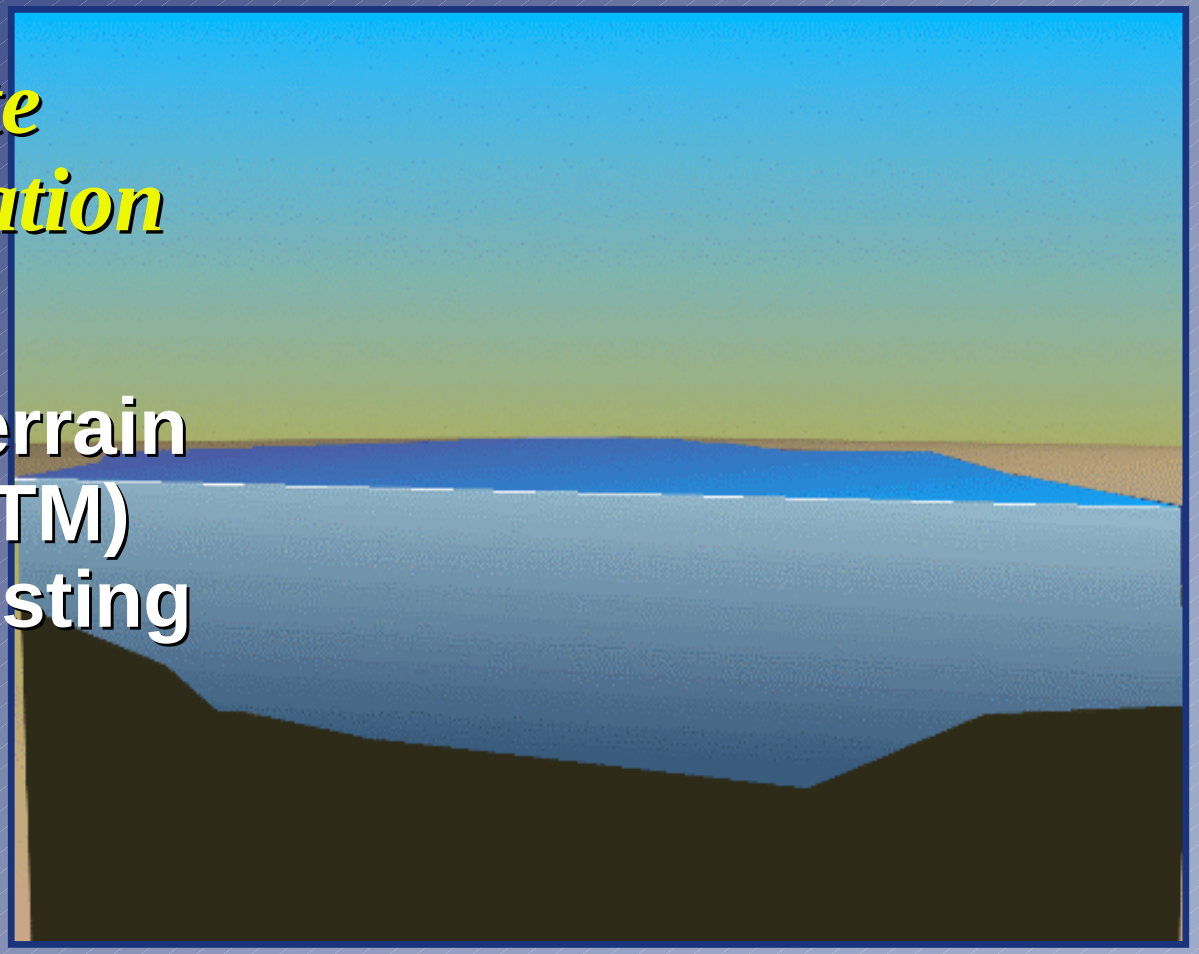
Sediment removal accuracy

- *Accurate site characterization*
  - Detailed Digital Terrain Model (DTM) of the existing bottom



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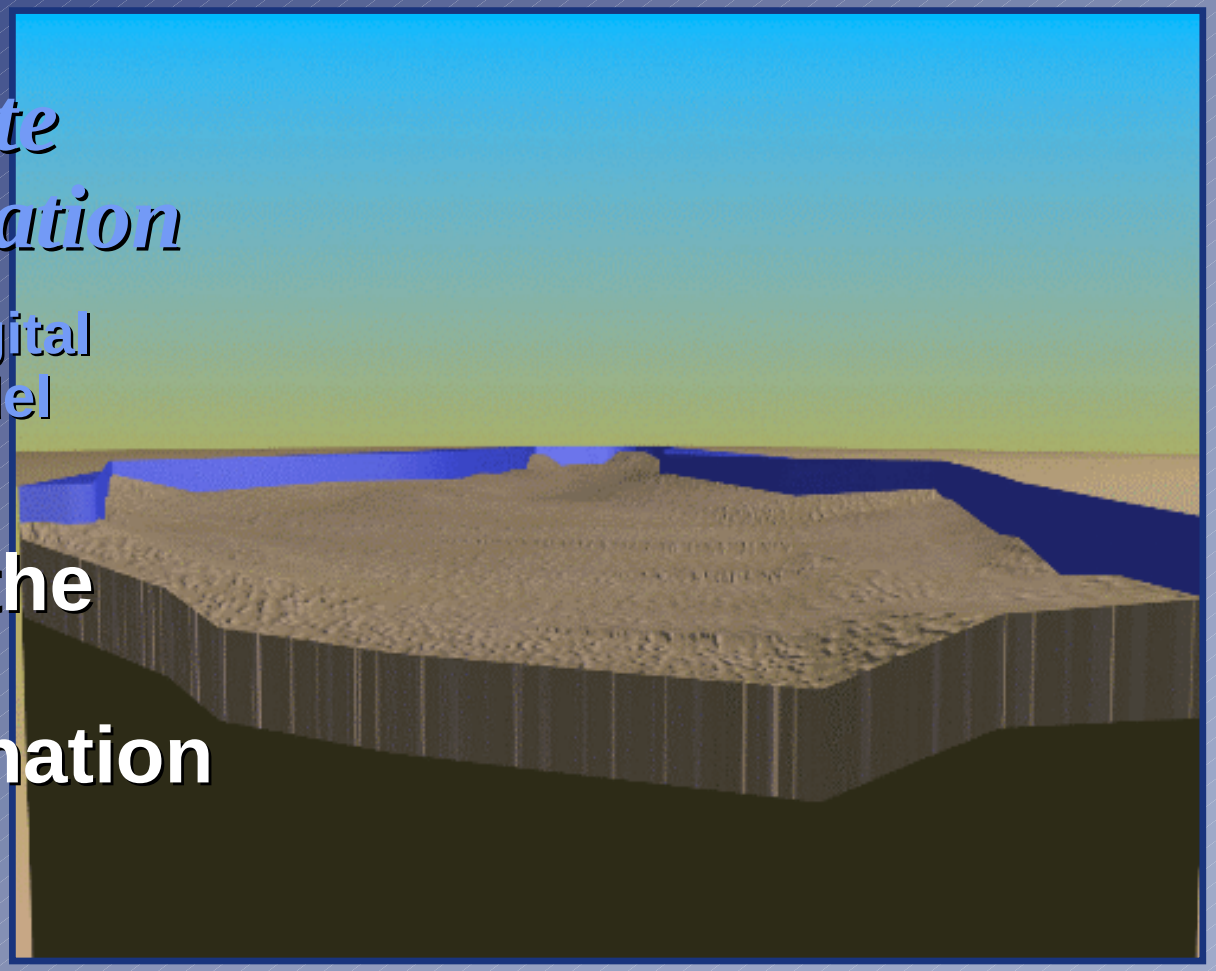
Sediment removal accuracy

- *Accurate site characterization*
  - Detailed Digital Terrain Model (DTM)
  - **Identify the limits of contamination**



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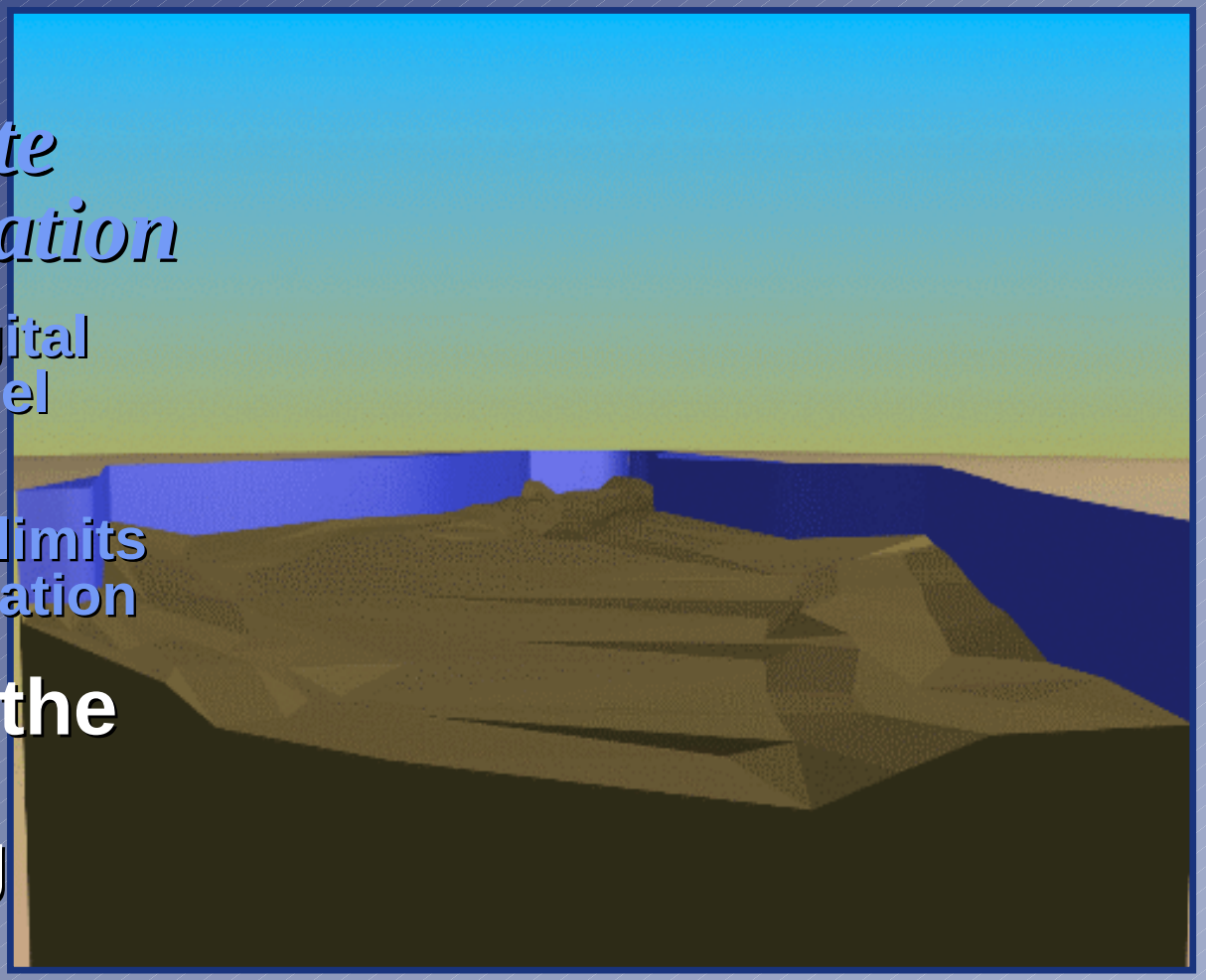
Sediment removal accuracy

- *Accurate site characterization*
  - Detailed Digital Terrain Model (DTM)
  - Identify the limits of contamination
  - **Develop the required dredging template**



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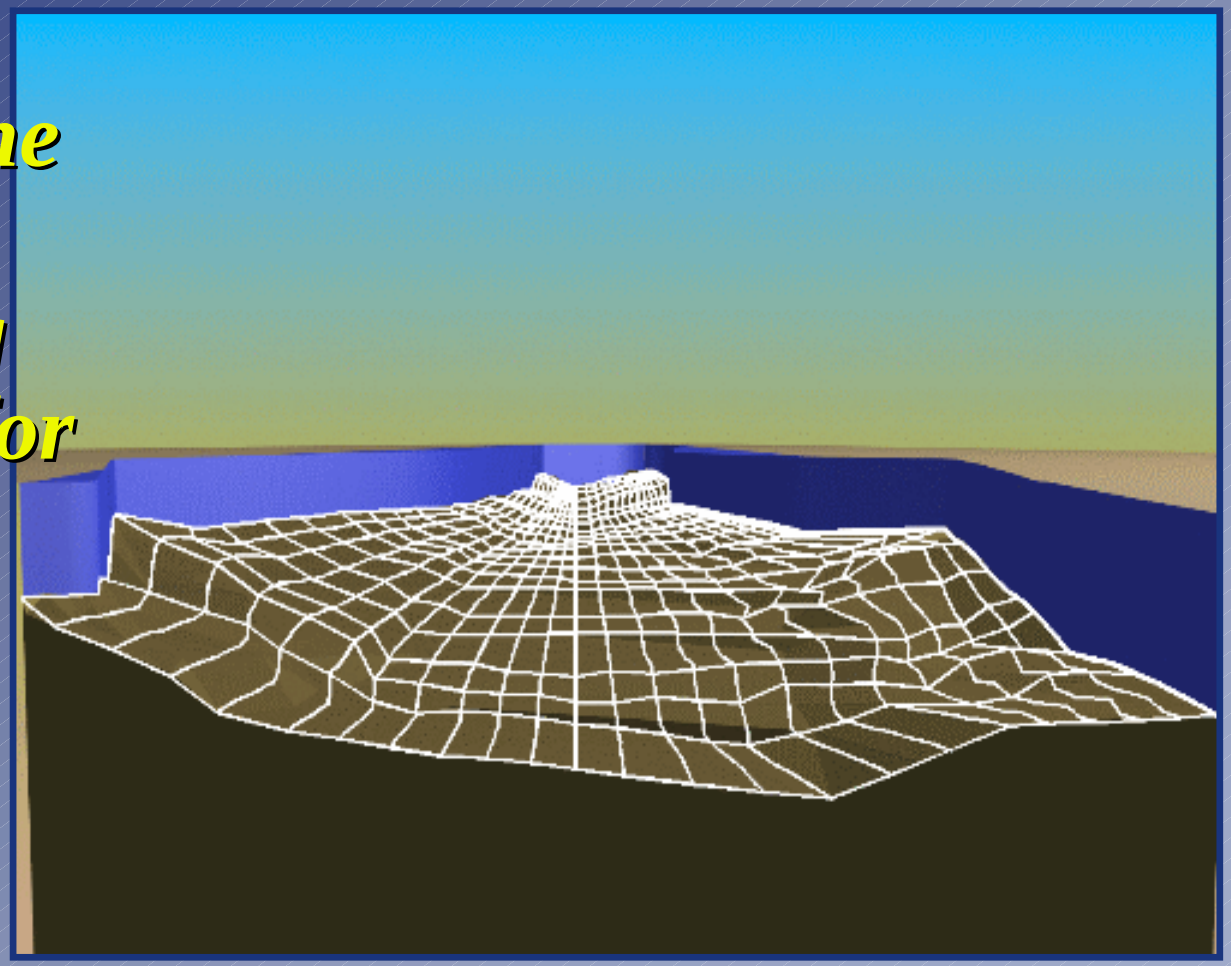
Sediment removal accuracy

- *Program the dredge positioning computer for limits of dredging*



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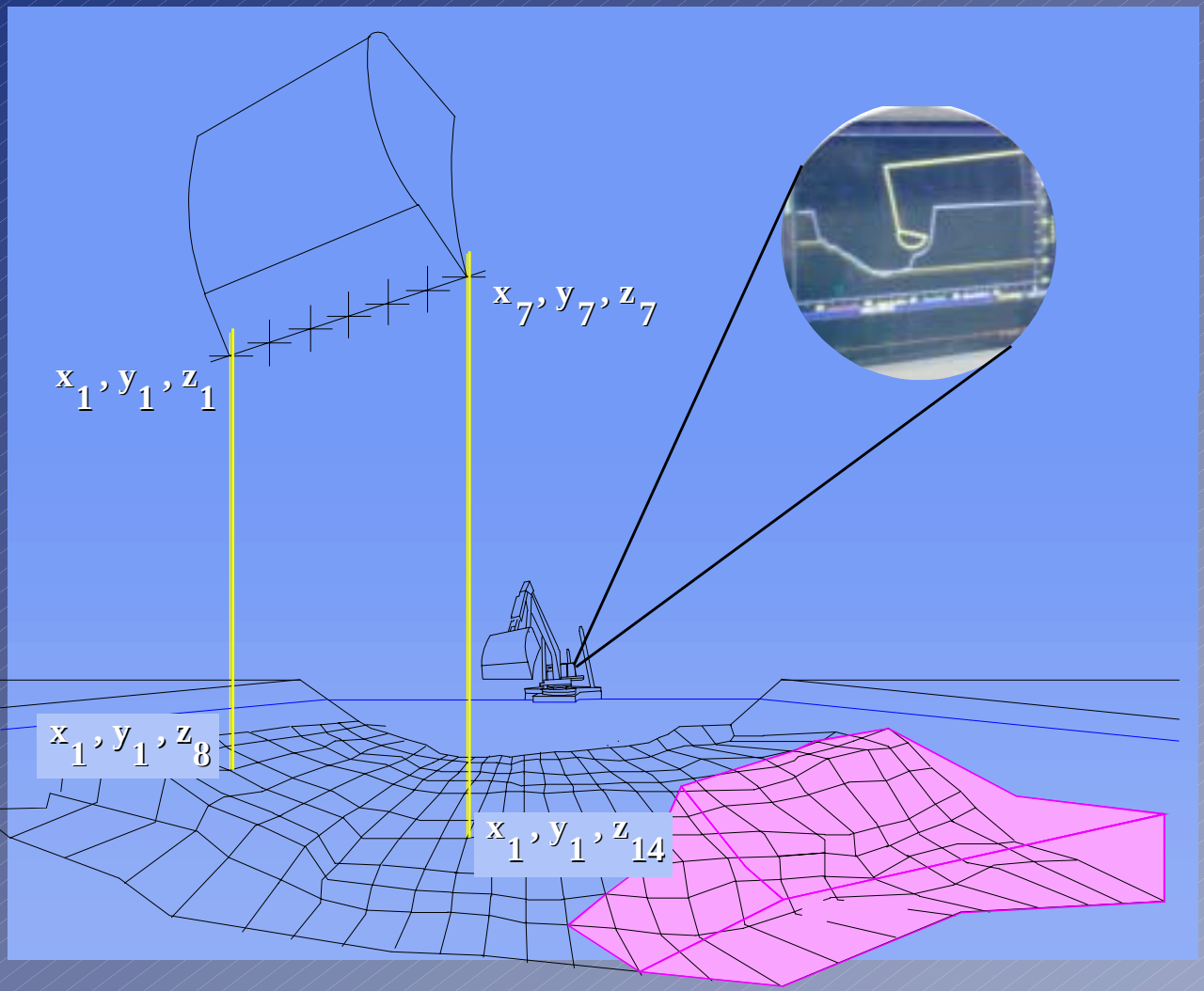
Sediment removal accuracy



The Result: Unparalleled Precision

- Minimal over-dredge
- Handling of complex contours
- Sub-decimeter accuracy

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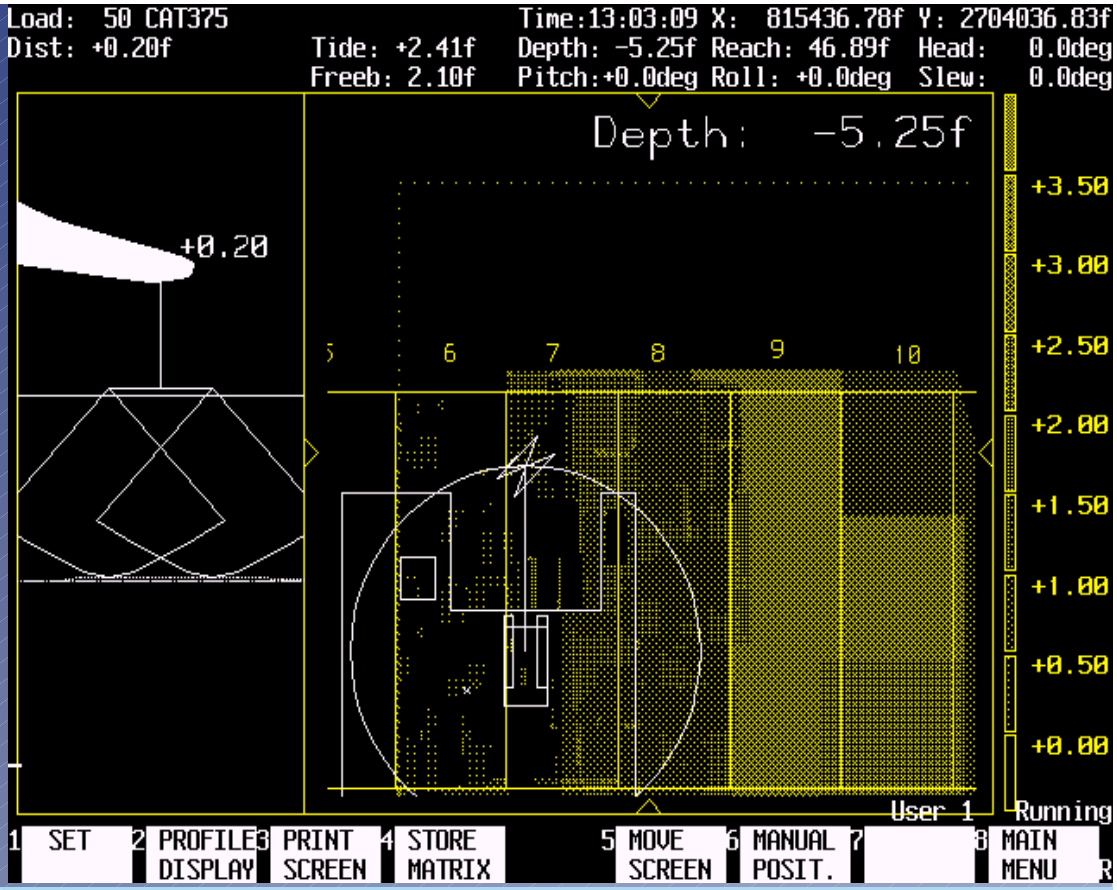
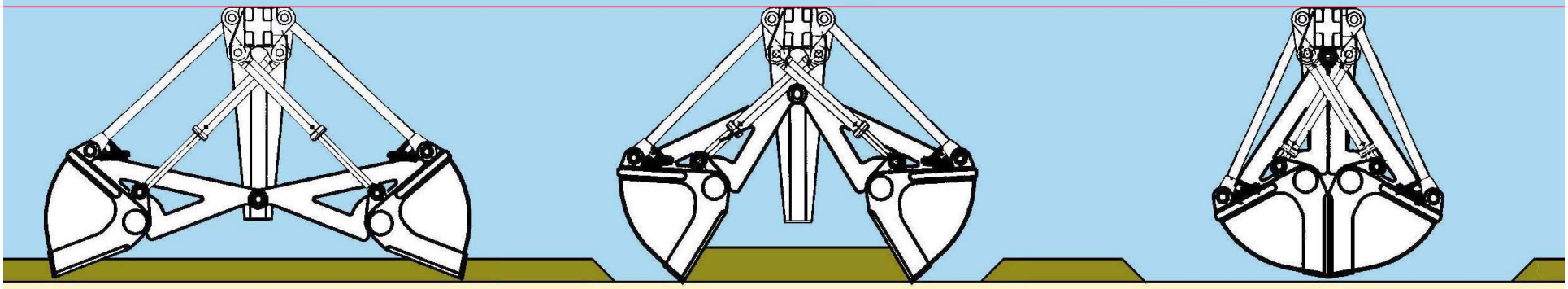
Sediment Removal

Dredge Operator's View

Crane Monitoring System (CMS)

Horizontal Profiling Grab (HPG)





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Additional Positioning Challenges

- *Wind, current, wave and tide make vessel positioning difficult*
- *Vessel movements complicate excavator control*


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Meeting the Challenges with
Specifically designed equipment
Horizontal Profiling Grab (HPG)
Crane Monitoring System (CMS)
High speed integrated barge, crane, DGPS RTK positioning computers
(Patent Pending)

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Meeting the Challenges with

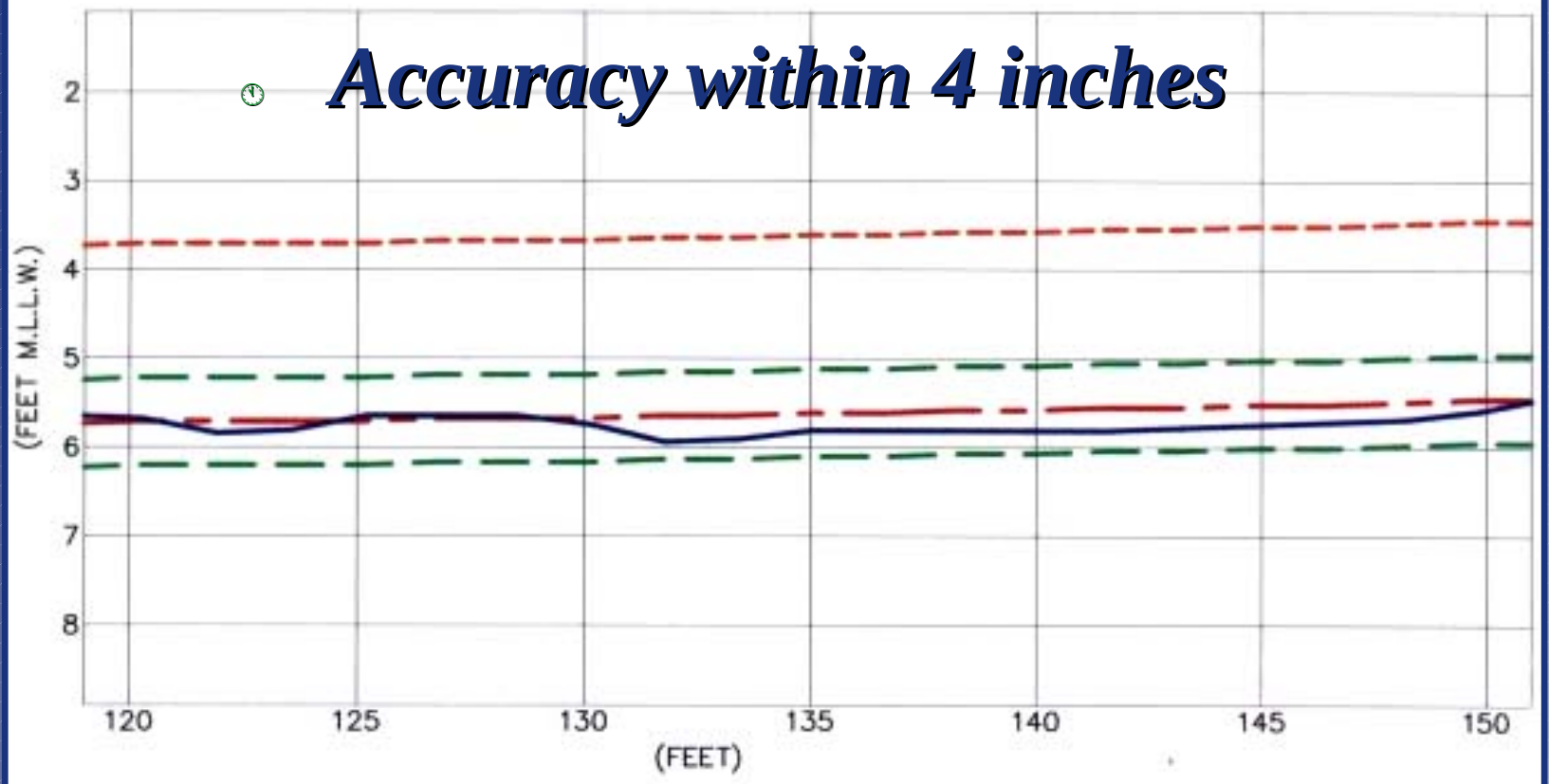
Click here for animation

Equipment proven thru six years of service

- Handles debris effectively
- Surgical removal of contaminated sediment only
- Minimal turbidity and resuspension
- Delivers a level bottom without spillage
- Allows accurate monitoring and quality control

Typical Post Dredge Cross Sectional View

- *Accuracy within 4 inches*



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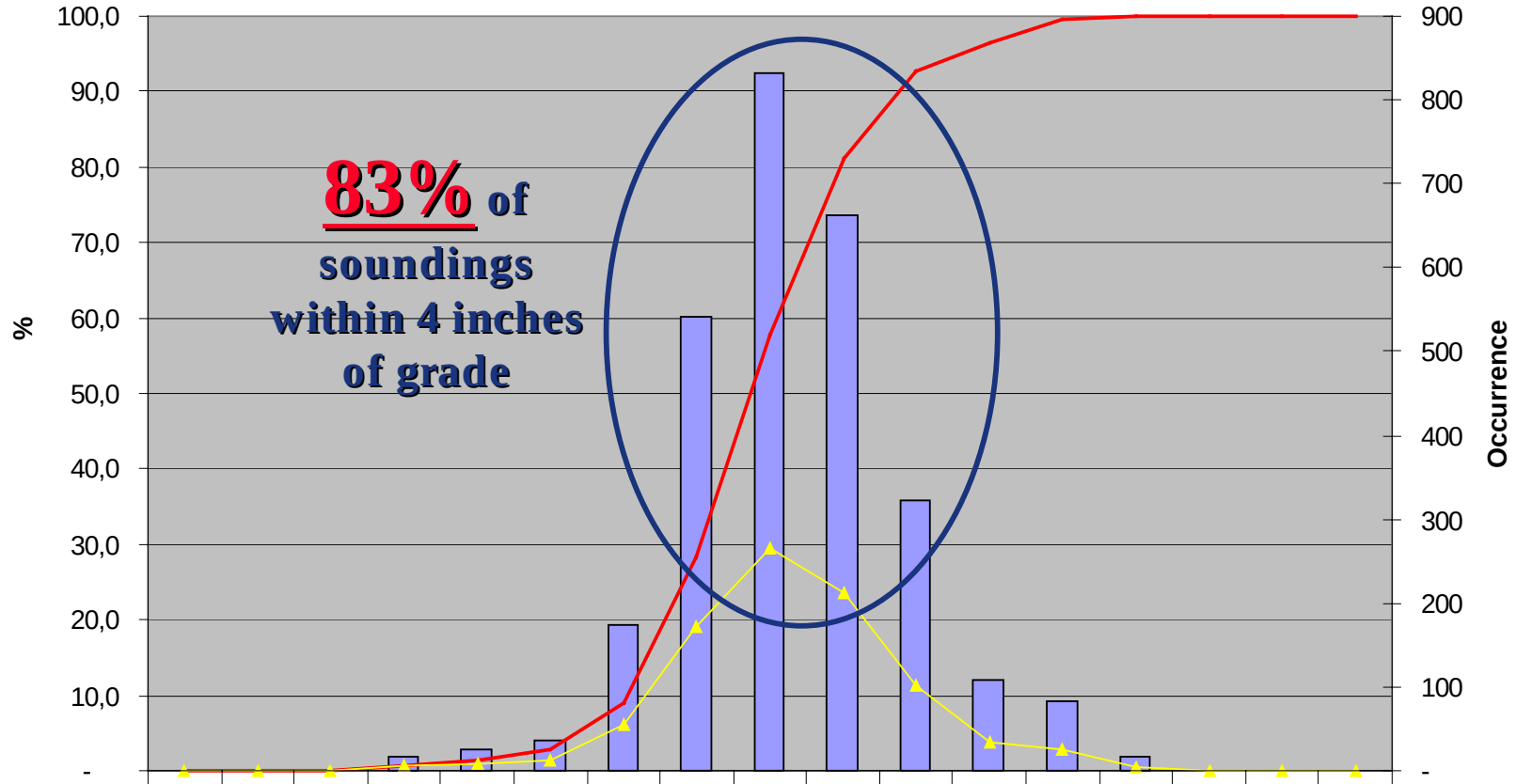
New Bedford Dredge Test

Dredging Accuracy Cut 6 -According to Post Dredge Survey- (excluded 3' slope north and south side)



	>0.9	0.9-0.8	0.8-0.7	0.7-0.6	0.6-0.5	0.5-0.4	0.4-0.3	0.3-0.2	0.2-0.1	0.1-0.0	0.0-0.1	-0.1-02	-0.2-0.3	-0.3-0.4	-0.4-0.5	-0.5-0.6	-0.6-0.7
Occurance	-	-	-	17	25	37	175	541	833	663	322	108	83	16	-	-	-
Cumulative %	-	-	-	0,6	1,5	2,8	9,0	28,2	57,7	81,2	92,7	96,5	99,4	100,0	100,0	100,0	100,0
freq %	-	-	-	0,6	0,9	1,3	6,2	19,2	29,5	23,5	11,4	3,8	2,9	0,6	-	-	-

Deviation of theoretical levels per 0.1 feet
(positive is a higher level, negative is a lower level)

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Transportation and disposal efficiency

- *Reduce or eliminate added free water during the process*
- *Transport the material at maximum practical concentrations*
- *Recycle the transportation medium*

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Transportation

- ***The patented Slurry Processing Unit (SPU)***
  - Delivers a pre-defined optimum slurry characteristic
  - Closed loop transportation system
  - Recycles process / make-up water
  - Dual containment transportation system
  - Computerized process control
  - Effective continuous quality control

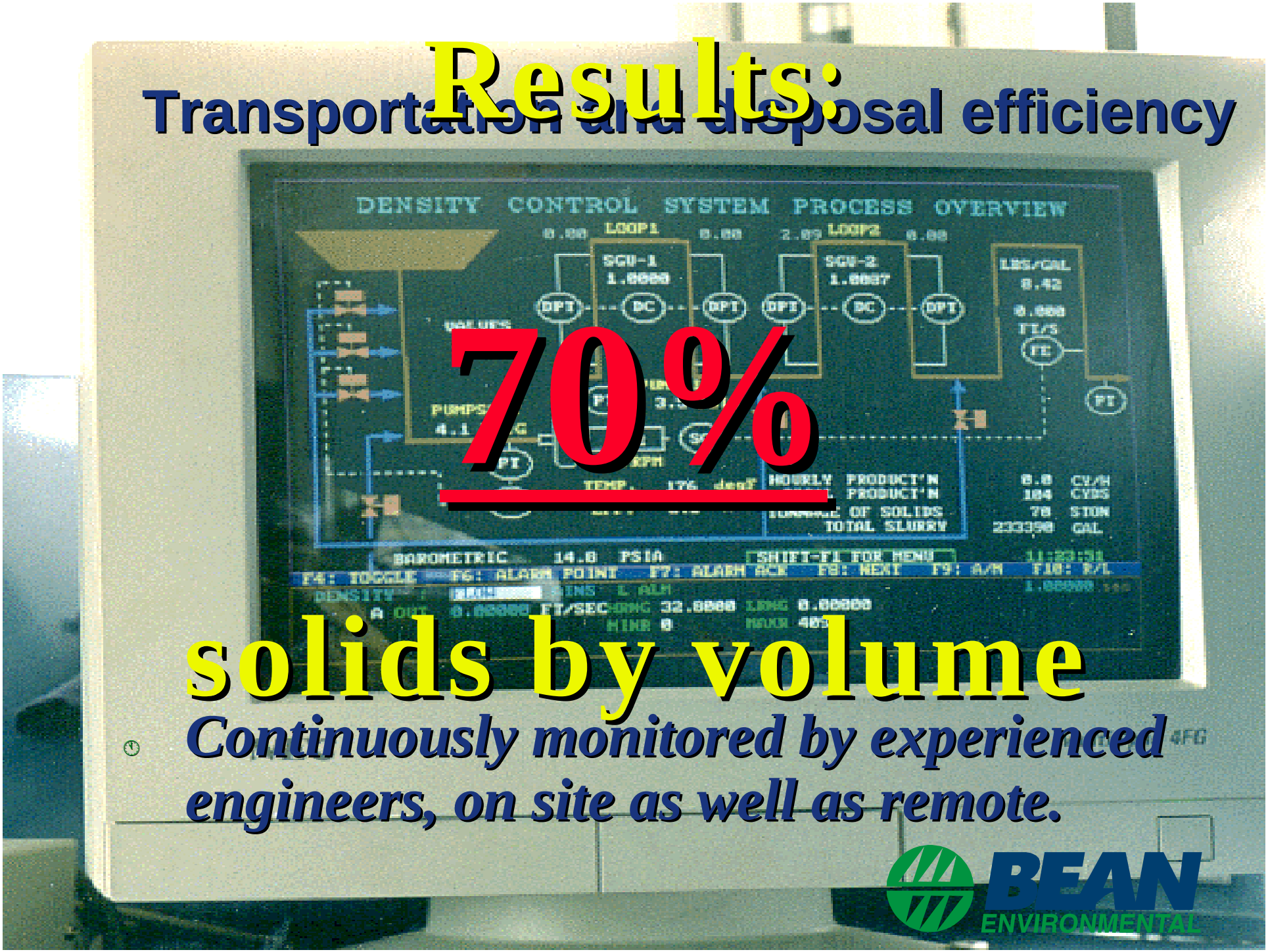

Confined Disposal Facility
New Bedford Harbor, MA
Incoming Sediment
3 Cells
Cell 1 received sediments


Confined Disposal Facility
New Bedford Harbor, MA
Return Water Line
3 Cells
Cell 1 received sediments
Cell 2 decant facility (return water supply)


Confined Disposal Facility
New Bedford Harbor, MA
Water Treatment Plant
3 Cells
Cell 1 received sediments
Cell 2 decant facility (return water supply)
Final holding area for clean water return

Results:

Transportation and disposal efficiency



solids by volume

- *Continuously monitored by experienced engineers, on site as well as remote.*

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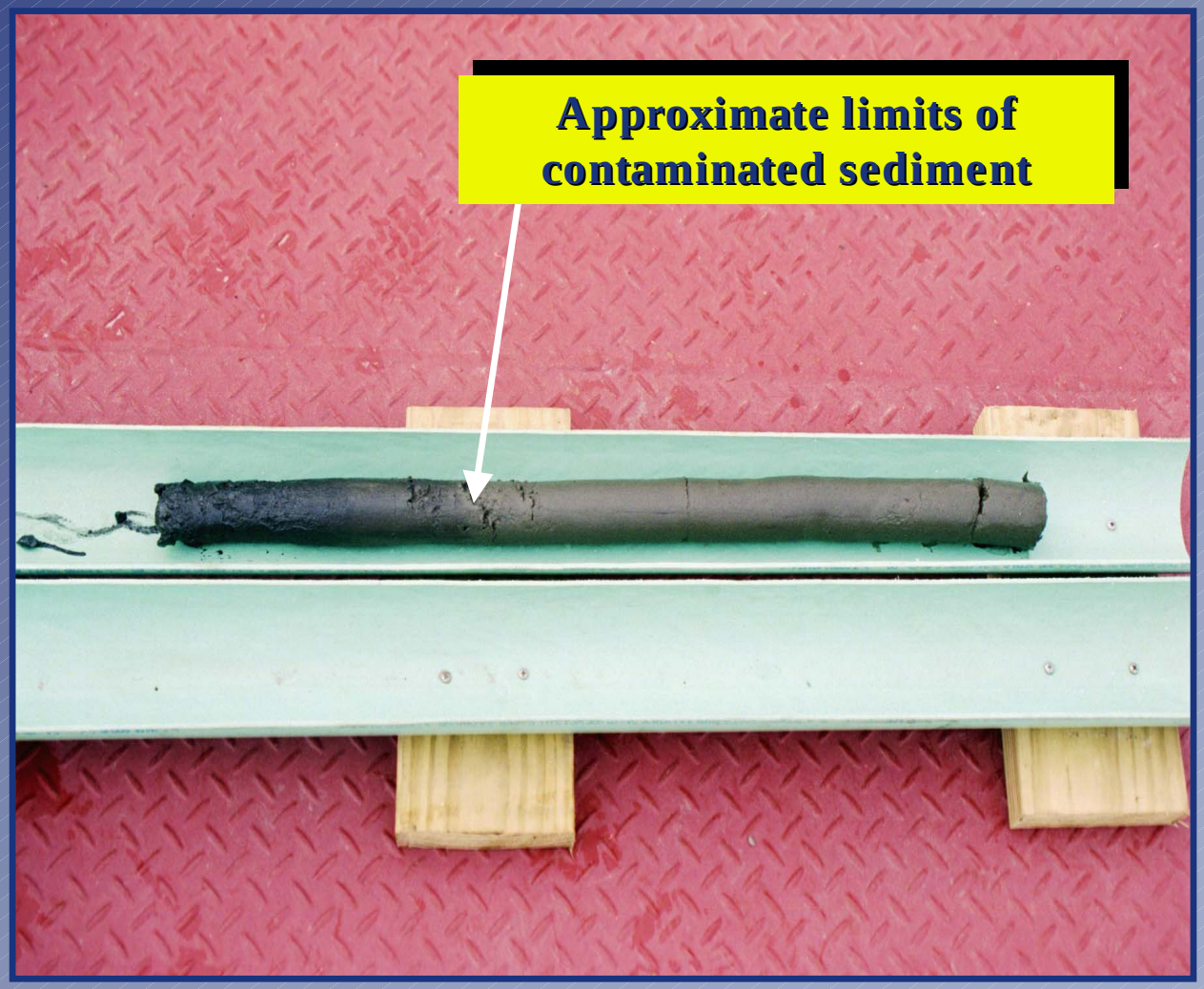
PCB removal efficiency

- *Virtually all contaminated material removed from the designated dredge area.*



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PCB removal efficiency

Contaminated sediment inflow from surrounding areas

- ***Despite the inflow,***

97%

of the PCB contamination removed

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Air & Water quality impacts

- *Field monitoring to assess sediment re-suspension*

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Water quality impacts

- *The actual dredging process resulted in a limited impact on the water column.*
- *Support activities around the project had a greater impact on the water quality.*
- *Ambient and local disturbances appear to have a similar or greater impact than the dredging operation.*

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Air quality impacts

- ***Air Quality Monitoring, performed by FWENC, provided an indication of relative contributions from the various project activities to the ambient air concentrations***

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Air quality impacts

- ***Dredging activities were relatively small sources of PCB emissions compared to the exposed surface of the CDF.***
- ***Efforts to mitigate emissions during the dredging process were successful.***

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Dredge Productivity

- *Production was important but not paramount.*
- *The goal was effective removal, careful, efficient and calculated transportation.*

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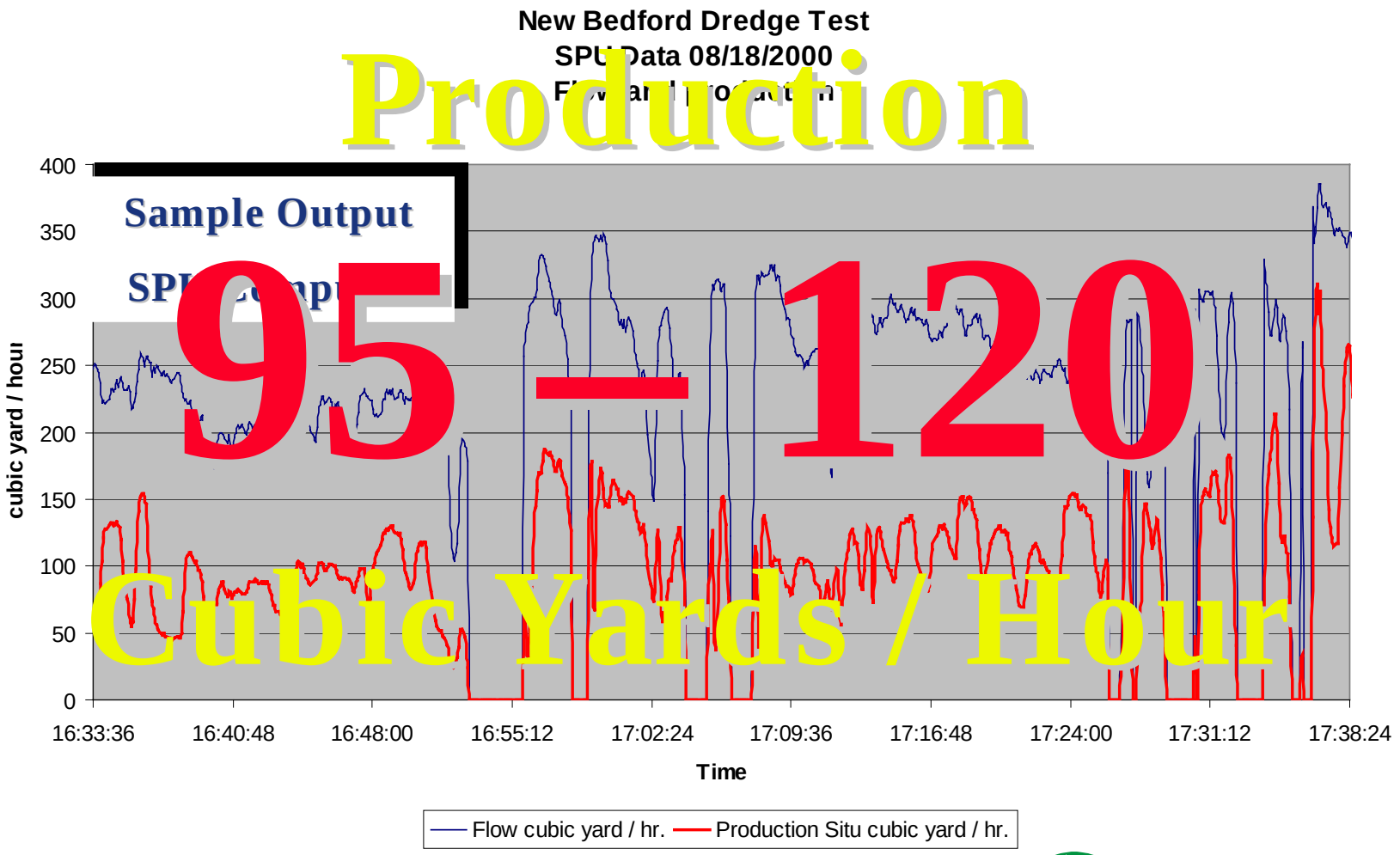
Dredge Productivity



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In Summary
Dredge Performance Tests Results:

Sediment removal accuracy	*Within 4 inches*
Transportation and disposal efficiency	*70% Solids by volume*
PCB removal efficiency	*97% removal*
Water quality impact	*Limited impact*
Air quality impact	*Limited impact*
Production	*95 – 120 cys / hour*

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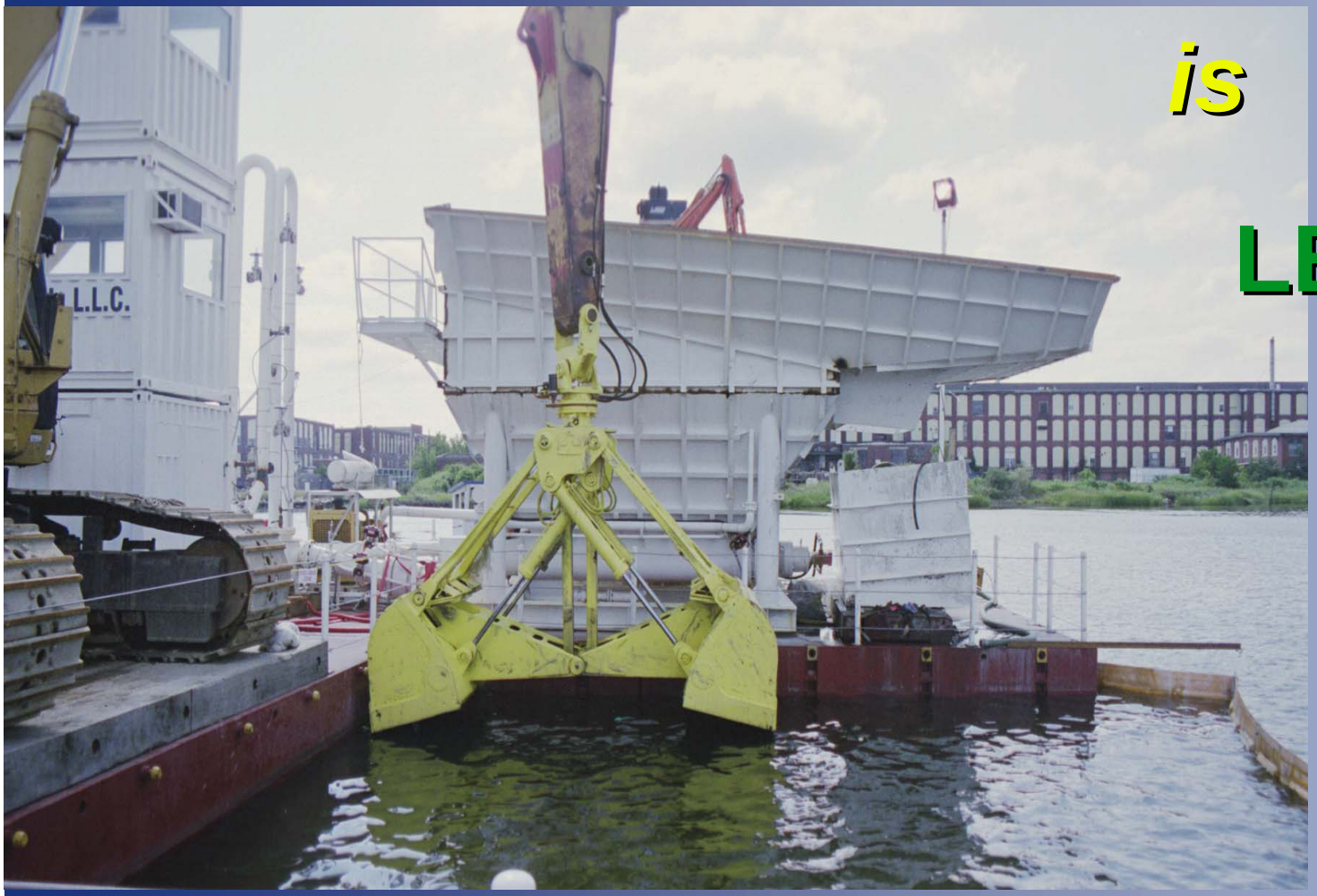

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Contact us at: ataylor@cfbean.com (504) 587 8600

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We look forward to working with you